State of Illinois
Department of Registration and Education
STATE GEOLOGICAL SURVEY, URBANA
John C. Frye, Chief

EARTH SCIENCE FIELD TRIP
GUIDE LEAFLET
KANKAKEE AREA

MAY 18, 1957

KANKAKEE COUNTY

KANKAKEE QUADRNGLE

Leaders
GEORGE E. EKBLAW
GEORGE M. WILSON

GUIDE LEAFLET NO. 57C

HOST: KANKAKEE HIGH SCHOOL

Geology Field Trip Itinerary

Kankakee Area

May 18, 1957

Mileage Interval	Total	
		Assembly in parking area (barricaded part of Merchant Street) between Junior and Senior High Schools, headed west.
	0.0	Intersection of Warren and Merchant streets. West on Merchant Street.
0.1	0.1	Turn right (north) on Orchard Street.
0.1	0.2	Stop. East Court Street - State Highway No. 17. Turn left (west).

Follow State Highway No. 17 west through business district of Kankakee to intersection with U.S. Highway No. 45, and thence follow U.S. Highway No. 45 west and north through Kankakee, Bradley, and Bourbonnais to severance of State Highway No. 113 N. in Bourbonnais.

Each driver will be responsible for observing traffic lights and otherwise following this portion of the route.

1.5	1.7	Railroad crossing -- numerous tracks.
0.6	2.3	Excavations for building foundations are partly in limestone, showing that it lies at shallow depth.
1.5	3.8	Y-junction of U.S. Highway No. 45 and State Highway No. 113 N. Bear left (northwest) on Highway 113 N.

Rising on northwest side slope of subglacial channel through Minooka moraine.

1.4	5.2	Stop No. I. Crest of Minooka moraine.

Tens and hundreds of thousands of years ago most of Illinois, together with most of northern North America, was covered by huge ice-sheets or glaciers. These glaciers expanded from centers in what is now eastern Canada. They developed when for some reasons not yet determined the mean annual temperatures in the region were somewhat lower than now, so that not all of the snow that fell during the winters was melted during the summers. The snow residues accumulated year after year until they became a sheet of ice so thick that as a result of its weight the lowermost part began to flow outward, carrying with it the soil and rocks on which it rested and over which it moved. The process continued until the glacier extended into our country as far south as Missouri and Ohio rivers.

At this time the temperatures moderated. The melting of the ice first balanced its accumulation and expansion, so that its margin remained stationary. Later the melting exceeded the accumulation and expansion, and the ice front gradually melted back until the glacier disappeared entirely.

As the glacier melted, all of the soil and rocks which it had picked up as it advanced were released. Some of this material or drift was

deposited in place as the ice melted. Such material consists of a thorough mixture of all kinds and sizes of rocks and is known as till. Some of the glacial drift was washed out with the melt-waters. The coarsest outwash material was deposited nearest the ice-front and gradually finer material farther away. The finest clay may have been carried all the way to the ocean. Where the outwash material was spread widely in front of the glacier it forms an outwash-plain; where it was restricted to the river valleys, it forms what are called valley-trains.

Some sand and gravel was also deposited at the edge of or actually within the glacier, by streams of melt-water flowing on, in, or under the glacier. Deposits along the courses of such streams now appear as ridges of gravel and are known as eskers. Deposits made where such streams emerged at the edge of the glacier or emptied into holes in the glacier now appear as more or less conical hills of gravel and are known as kames.

At times, especially in the winters, the outwash-plains and valley-trains were exposed as the melt-waters subsided. At such times the wind picked up silt and fine sand from their surfaces, blew it across the country, and dropped it to form deposits of what is known as loess. Glacial loess mantles most of Illinois. Near the large river valleys it may be as much as 60 or 80 feet thick. Far from the valleys it may be measured only in inches, if it can be identified at all.

It is now commonly known that there were four major periods of glaciation during the Pleistocene or Great Ice age, (see accompanying table) and that between each pair there was a long interglacial period in which conditions were as they are today. It is also commonly known that during each major glaciation there were a number of retreats and readvances. This was particularly true during the last or Wisconsin glacial stage.

The position of the ice-front at each advance is marked by a ridge of till or moraine. The moraine represents the accumulation of drift at the ice-margin while the advance and melting were essentially in balance, when more and more material was being brought to the edge by the advancing ice. When melting exceeded advance, so that the ice-front retreated, the resulting drift deposits form a drift-plain or till-plain, whose surface may be almost level or more or less billowy.

This stop is on the top of the Minooka moraine, one of the moraines of Wisconsin age. To the south lies another moraine, the Marseilles, which will be seen later on the trip. Between the Marseilles and Minooka moraines lies the principal valley of the Kankakee Torrent, which will be discussed shortly. To the northeast lies a third moraine, the Manhattan -- a low narrow moraine that is hardly recognized as such by a casual observer. Between the Minooka and Manhattan moraines is the Minooka till plain, through which high-level waters of the Kankakee Torrent eroded a shallow valley. As shown on the accompanying map of moraines in northeastern Illinois, these are only three of several of Wisconsin age.

The surface relief of moraines is generally greater than that of the drift-plains. It is generally referred to as swell-and swale, but on some moraines it is termed knob-and-kettle topography. Generally

the outer slope and edge of the moraines is interrupted by valleys and re-entrant angles marking the courses of glacial rivers. At some places there are gaps in the moraines where subglacial streams presumably carried away most of the drift. Subglacial valleys may be distinguished from valleys developed by erosion in post-glacial time by the fact that morainic topography occurs all the way down to valley slopes.

There are two general geological situations in the Kankakee area that should probably be discussed at this point, as they are reflected in much of the phenomena that will be observed today. The first is that the area is universally underlain by bedrock of Silurian age. This bedrock is dolomite, but as will be seen later it may vary markedly in character within short distances. Also, because of preglacial erosion the surface of the bedrock is very irregular, and for that reason, as well as because of the surface irregularities of the drift mantle, the depth to bedrock may vary greatly within short distances. Some flattish areas in the region may be underlain by bedrock essentially at the surface, in others it may not be encountered for 100 feet or more. Some hills in the region consist of glacial drift only; others, such as the one that occupies most of sec. 20 a mile west of Manteno, may consist entirely of limestone with practically no drift mantle.

The second general geologic situation concerns what is termed the Kankakee Torrent. This Torrent consisted of the melt-water from the Valparaiso glacier, the glacier that deposited first the Manhattan moraine and then later moraines farther to the northeast. For some unknown reason the melt-water from the Valparaiso glacier seemed to constitute a much greater volume than had been derived from any other glacier that invaded or approached Illinois. The melt-water from that portion of the glacier that lay between Lakes Erie and Michigan escaped through Kankakee valley. It came down the valley from Michigan and Indiana in an amount that could not contemporaneously escape through the valley-gap that existed in the Marseilles moraine at Marseilles at that time, and so the waters spread widely through the Morris basin, to form what we call Lake Wauponsee, through the Kankakee valley back into Indiana, overflowed south into the basin of Iroquois River to revive Lake Watseka, and thence flowed down the Illinois-Vermilion valley past what is now Pontiac and Streator. But here again all the flood water could not escape through the valley-gap in the older Farm Ridge moraine at LaSalle, and so it spread out between the Farm Ridge moraine and the Marseilles moraine to form what we call Lake Ottawa in the Illinois Valley, and between the Cropsey and Marseilles moraines to form what we call Lake Pontiac in the Vermilion Valley. All of these lakes are shown on the map accompanying guide leaflet.

The flood did not occur just once, or all at once. It was doubtless repeated year after year for many, possibly hundreds, of years. In the early years it was doubtless small, but as the years passed it became larger and larger until at some time it reached a maximum, and then, as the Valparaiso glacier receded, it gradually subsided.

At the beginning of the Kankakee Torrent, Kankakee Valley in the vicinity of Kankakee was not nearly as deep or as broad as it is now. It was probably a wide plain of Marseilles drift, through which a small river found its way. When the Torrent first attained considerable volume, it spread widely across this plain and at its highest

level it also found avenues through subglacial channels in the Minooka moraine and flowed across the drift plain behind the moraine. As the Torrent continued, it kept eroding deeper into the Marseilles drift plain, removing practically all of the drift, and even eroding into the Silurian dolomite beneath. In its last stages it cut definite channels in the bedrock.

Outwash from the glacier was of course carried by the melt-water but most of it was carried beyond the Kankakee area by the torrential waters. Some of the coarser outwash, however, together with the coarse residuals from the local drift and with rubble ripped from the bedrock by the Torrent, was deposited as bars in the course of the Torrent. In its waning stages the Torrent deposited sand and silt, some again in bars, some spread over the valley. Much of this sand has been reworked by the wind. Locally there are sand dunes built by the wind, but most of them are associated with the bars.

All of these and other associated features of the Torrent will be observed during the trip.

0.3	5.5	Turn left (south) on gravel road.
0.2	5.7	Turn right (west).
0.8	6.5	Crossing Davis Creek. Note bedrock in sides of valley on both sides of road.
0.05	6.55	Turn right (north).
0.75	7.3	Stop. State Highway No. 113 N. Turn right (east).
0.3	7.6	Crossing Davis Creek. This stream flows in a subglacial channel through Minooka moraine. The brush on the north (left) side of the road, on the east side of the stream valley, marks the location of what is reported to have been the first permanent habitation of a white man in the Kankakee area.
1.2	8.8	Turn left (north) on gravel road.
0.5	9.3	Intramorainal channel. It marks the edge of the Minooka ice front at a brief halt as it started to recede from its most advanced position.
1.5	10.8	Turn right (east).
1.0	11.8	Stop. U.S. Highway No. 45. Straight ahead.
0.4	12.2	Crest of back ridge of Minooka moraine.
0.8	13.0	Caution and stop. Railroad crossing and U.S. Highway No. 54. Turn left (north) on highway.

To northeast is Minooka till plain traversed by high-level channel of Kankakee Torrent.

1.2	14.2	Stop No. II. Quarry of Manteno Limestone Company.

This quarry is in one of the numerous reefs that characterize the

Silurian bedrock in northeastern Illinois. Several types of rock occur in the reef, depending on the part of the reef in which they were deposited, and the kinds of fossils that may be found vary for the same reason.

The core of the reef was built up by the accumulation in place of the stony skeletons of such animals as corals, stromatoparoids, and associated phyla, supplemented by fine fossil debris. On the flanks of the reef the fossil debris accumulated in beds parallel to the slope. Between reefs the beds are horizontal -- at some places they are good dolomite, at others they are very argillaceous. Reefs have a tendency to protrude above a bedrock plain.

The principal core of this reef is in the northeast corner of the quarry, but cores of smaller parts of the reef occur also in the northwest part of the quarry. Beds of good rock dipping southwesterly off the core of the reef are exposed in the sides of the quarry. Thin shaly horizontal beds can be seen in the southwest part of the quarry.

Also prevalent in the Silurian bedrock in northeastern Illinois are deposits of Pennsylvanian siltstone and clay. They appear to fill old sink-holes in the dolomite, but the current interpretation is that although the depressions are sinks, they occurred after, not before, the Pennsylvanian beds were deposited and that the Pennsylvanian strata settled into the sinks as they were being dissolved. The evidence for this interpretation is (1) the position and altitude of the Pennsylvanian strata where they can be observed in the sinks and (2) the "slickenlites" on the surface of the dolomite in the sides of the sinks, even on the under sides of projecting beds.

On leaving quarry, turn south (left) on highway.

1.2 15.4 Turn left (east) on St. George Road.

This is the back slope of the Minocka moraine. About a mile to the northeast is a high-level Kankakee Torrent channel. Beyond is Minooka drift plain, with the Manhattan moraine about 5 miles to the northeast. The torrent channel is eroded down to bedrock, which presumably prevented further deepening. Deposits of fine gravel occur along the sides and locally in the bottom of the channel.

1.6 17.0 Crossing Soldier Creek. Note erosion shoulders on both sides of narrow valley on south (right) side of road.

2.2 19.2 Turn right (south).

0.2 19.4 Stop No. III. Exline Creek, which originates in a subglacial channel through the Valparaiso moraine about 15 miles to the northeast, flows in a sluiceway cut by the Valparaiso melt-water that escaped through this valley to the Kankakee Torrent. Outwash carried by glacial Exline Creek was deposited along the sides of the valley. From the physiographic relations at this locality, it appears that the outwash was deposited during the earliest stages of the Torrent and that later, as the level of the Torrent was lowered, the melt-waters cut a channel or sluiceway through the outwash, leaving it as low terraces along the channel.

0.8	20.2	Turn left (east).
0.1	20.3	Stop No. IV. To the southwest is an excellent view of the terrace-sluiceway relationship along Exline Creek. From that point to the point of the stop the terrace gradually merges into a drainage way indigenous to the original drift plain or possibly locally developed by high-level Kankakee Torrent waters, as in the low tableland to the east and southeast bedrock is near the surface.
0.4	20.7	Turn right (south).
1.9	22.6	Caution - railway crossing at Exline. Note Exline Creek sluiceway a short distance to west. The sluiceway has a relatively uniform width and depth throughout its course and also maintains a considerable gradient.
0.6	23.2	Approximately at this point begins what is probably a fan at the mouth of the Exline Creek sluiceway, deposited in Kankakee Torrent.
1.5	24.7	Stop. State Highway No. 17. Turn left (west) on highway. Just west of turn is bridge over original Exline Creek, flowing southeasterly. Years ago the main portion of the stream was artificially diverted to Baker Creek, flowing southwest instead of southeast, to empty into Kankakee River several miles below the mouth of old Exline Creek, with a consequent improvement in the drainage gradient in the creek. The point of diversion is in the NE. NE.$\frac{1}{4}$ sec. 36, as may be noted on the map.
0.7	25.4	Stop No. V. To west and northwest is a bluff of Minooka till eroded by the Kankakee Torrent in its more concentrated stage. This bluff was the northwest wall of the principal Torrent at this locality. The character of the fan at the mouth of Exline Creek where it emptied into the Torrent can also be observed from this point.
0.5	25.9	Bridge over Baker Creek -- now the outlet stream for Exline Creek.
2.9	28.8	Turn left (south) on South Nelson Avenue.
0.1	28.9	Turn right (west) on Maple Street.
0.1	29.0	Turn left (south) on Osborn Avenue.
1.0	30.0	Turn left (east) on Cobb Boulevard.
0.1	30.1	Stop No. VI. Bechman Park. LUNCH.
0.1	30.2	Turn left (north) on Justine Drive.
0.3	30.5	Turn right (east) on Duane Street.
0.5	31.0	Turn right (southeast) on Maple Street.
0.1	31.1	Turn left (east) in lane.
0.2	31.3	Caution. Railway crossing and entrance to clay pit and brick plant of Kankakee Clay Products Company.

Stop No. VII A. The pit exposes glacial clay, presumably of Marseilles age, overlain unevenly by irregularly bedded silt, sand, and gravel, presumably outwash from the Minooka glacier, in turn overlain locally by Kankakee Torrent material.

0.2	31.5	Stop No. VII B. In lane, just before returning to Maple Street.

East side of new highway under Maple Street exposes Minooka outwash over Marseilles glacial clay over gravel, presumably also of Marseilles age.

Turn left (southeast) on Maple Street.

2.3	33.8	Stop No. VIII. Exposure of gravel overlain by sand in excavations for sewers and houses.
0.1	33.9	Stop. Aroma Park. Jog right (south) to Third Street.
0.4	34.3	Stop. Bridge Street. Turn right (south).
0.2	34.5	Crossing Kankakee River.
0.3	34.8	Bear left and turn left (east).
0.4	35.2	Caution. Railway crossing.
0.8	36.0	Turn right (south).
0.7	36.7	Caution. Railway crossing.
0.4	37.1	Stop No. IX. View of Mt. Langham, a complex kame at the apex of re-entrant angle in the front of the Marseilles glacier, with low morainic limbs to southwest and southeast. The kame complex consists of one large and several smaller kames interspersed with undrained kettles. A subglacial channel, in which Deer Creek rises, borders the east side of the kame complex.
0.5	37.6	Turn right (west). Note numerous boulders along roadside.
0.2	37.8	Note "blow sand" along fencerow 1/4 mile to right (north). We are on marginal deposit of Marseilles age.
0.5	38.3	Turn left (south).
0.1	38.4	Stop. Paved highway. Now entering marginal area of glacial Lake Watseka.
0.9	39.3	Turn left (east).
0.3	39.6	Turn right (south).
1.0	40.6	Stop. Turn right (west).
1.4	42.0	Turn left (south).
0.6	42.6	Jog right and left.

0.3	42.9	Iroquois River.
0.1	43.0	Turn right (west).
1.3	44.3	Turn left (south). Note Marseilles moraine a mile to northwest.
0.2	44.5	Turn right (west).
1.1	45.6	Stop. State Highway No. 49. Straight ahead. Note Marseilles moraine to north, with numerous small reentrant angles and some subglacial channels, at the mouth of which there are deposits of sand and gravel, in some of which pits have been operated.
0.9	46.5	About a mile to north may be observed evidences of a former large gravel pit in a delta-fan in front of a subglacial channel in the moraine.
0.9	47.4	Stop No. X. On large fan-delta built out into Lake Watseka by large subglacial stream flowing from Marseilles glacier. This fan consists mostly of fine gravel. A distinct distributary channel cuts southeasterly across the fan.
0.2	47.6	Stop. U.S. Highways Nos. 45 and 54. Turn right (north) on highway. Note that we are in bottom of subglacial channel.
0.2	47.8	Note gravel exposed on right (east) side.
0.3	48.1	Fine view of subglacial channel gap to northwest.
0.5	48.6	Turn left (west). Caution. Railway crossing.
0.1	48.7	Turn right (north). Subglacial channel and sluiceway to west (left).
0.5	49.2	South margin of Kankakee Torrent.
1.4	50.6	Kankakee Torrent sand bar.
0.7	51.3	Caution. Railway crossing. Note that in dredging of stream on north side of railway rubble on bedrock was locally encountered, showing that (1) the Kankakee Torrent stripped off the glacial drift and (2) the surface of the bedrock is uneven.
0.4	51.7	Caution. Junction with State Highway No. 115. Straight ahead.
0.8	52.5	The low mound a mile to the east is a rock "hill," in which there was formerly a local quarry northwest of the farmstead.
0.7	53.2	Drainage ditch -- note rubbly dolomite gravel in banks.
1.1	54.3	Drainage ditch -- to east, note that it is first in sand, then in bedrock.
0.3	54.6	Sand bar of Kankakee Torrent.
0.1	54.7	Caution. Straight ahead off highway.
0.1	54.8	Turn left (west).

0.5 55.3 From this point on, note numerous residual boulders along roadside.

0.5 55.8 Turn right (north).

0.9 56.7 Stop. State Highway No. 17. Turn left (west).

1.2 57.9 Entering complex of sand bars of Kankakee Torrent. Much of the sand in these bars has been removed for commercial molding sand and for fill material.

0.7 58.6 Crest of prominent bar.

0.2 58.8 Caution. Railway crossing.

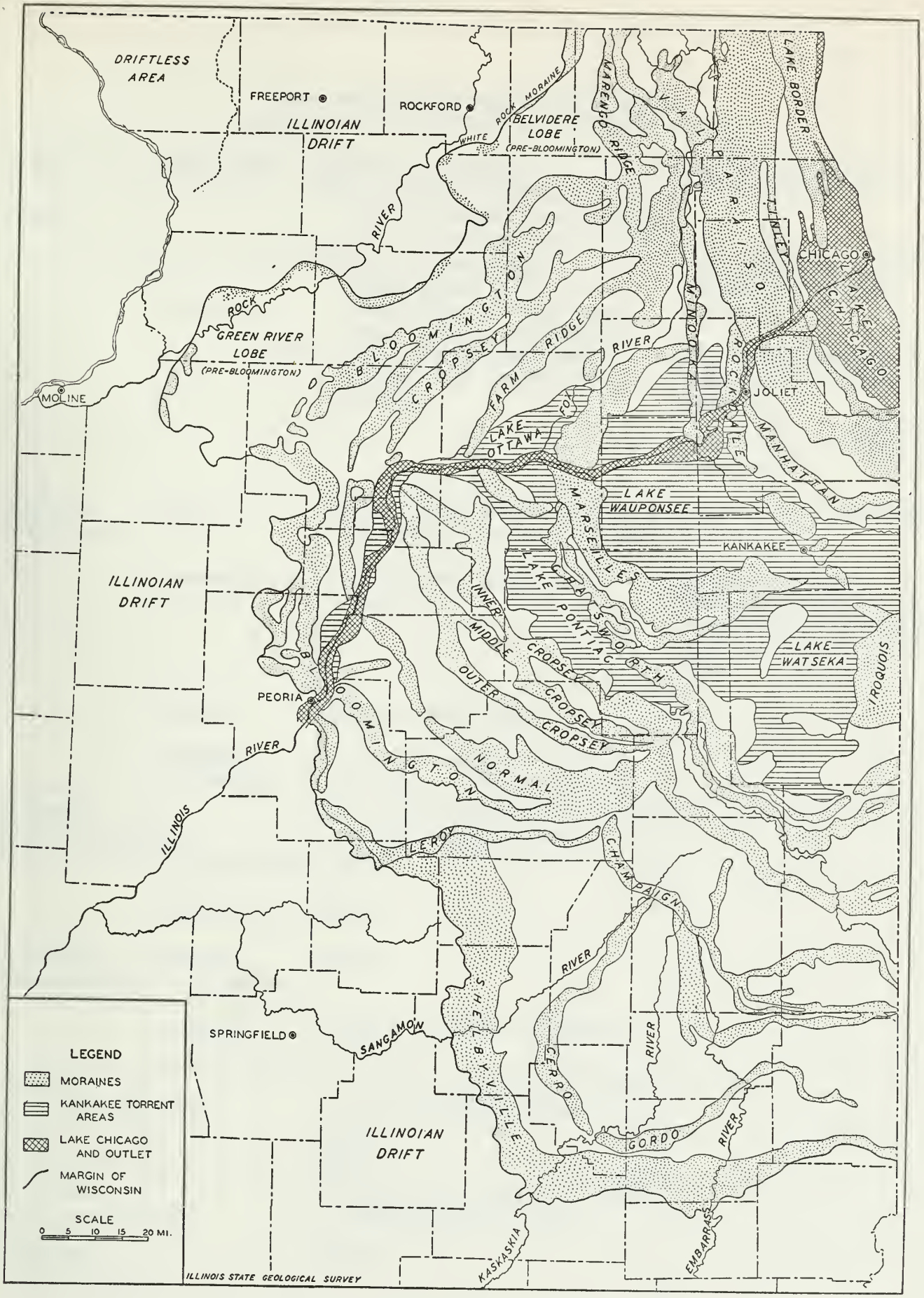
0.4 59.2 Stop No. XI. Exposure of sand in pit in Kankakee Torrent bar.

1.5 60.7 Turn left (south).

1.4 62.1 Turn left (east) into Lehigh Stone Company quarry.

Stop No. XII. In this huge quarry is exposed relatively pure, relatively uniform dolomite of Niagaran (Silurian) age. Large "sinks" filled with Pennsylvanian strata are not uncommon.

End of trip. Au revoir! See you next fall!



GLACIAL GEOLOGY IN NORTHEASTERN ILLINOIS

Compiled by George E. Ekblaw from data furnished by the Survey

January 1, 1942

Time Table of Pleistocene Glaciation
(after M. M. Leighton and H. B. Willman, 1950)

Stages	Sub-stages	Nature of Deposits	Special Features
Recent		Soil, infant to youthful profile of weathering, lake and river deposits, dunes, peat.	
Wisconsin (4th glacial)	Late Mankato	Fluvial deposition - Mississippi, Illinois, and Ohio river valleys; dune sand, some loess deposits along Mississippi River Valley; and deposits in Lake Chicago.	Lake Agassiz Torrent eroded Late Mankato deposits
	Early Mankato		Lake Duluth Torrent eroded Early Mankato deposits
			Forest bed, Two Creeks, Wisconsin
	Cary	Drift, loess, dunes, beginning of deposits in Lake Chicago	Kankakee and Lake Maumee Torrents
	Tazewell	Drift, loess, dunes, lake deposits	Fox River Torrent Westward diversion of Mississippi River into Iowa by Tazewell ice lobe
	Iowan	Drift, loess, dunes.	
	Farmdale (Pro-Wis.)	Loess (in advance of glaciation)	
Sangamon (3rd interglacial)		Soil, mature profile of weathering, alluvium, peat	
Illinoian (3rd glacial	Buffalo Hart	Drift	
	Jacksonville	Drift	
	Payson (terminal)	Drift	
	Loveland (Pro-Ill.)	Loess (in advance of glaciation)	
Yarmouth (2nd interglacial)		Soil, mature profile of weathering, alluvium, peat.	
Kansan (2nd glacial)		Drift Loess	
Aftonian (1st interglacial)		Soil, mature profile of weathering, alluvium, peat.	
Nebraskan (1st glacial)		Drift	

GEOLOGICAL COLUMN - KANKAKEE AREA

ERAS		PERIODS	EPOCHS	REMARKS
Cenozoic "Recent Life"	Age of Mammals	Quaternary	Pleistocene	Recent post-glacial stage Wisconsin drifts
		Tertiary	Pliocene Miocene Oligocene Eocene Paleocene	Not present in Kankakee area.
Mesozoic "Middle Life"	Age of Reptiles	Cretaceous		Not present in Kankakee area.
		Jurassic		Not present in Illinois
		Triassic		Not present in Illinois
Paleozoic "Ancient Life"	Age of Amphibians and Early Plants	Permian		Not present in Illinois
		Pennsylvanian	McLeansboro	Probably not present in Kankakee area.
			Carbondale	Probably not present in Kankakee area.
			Tradewater and Caseyville	Shale, coal, underclay, sandstone, siltstone - in sinks
		Mississippian	Chester (Upper Mississippian)	Not present in Kankakee area.
			Iowa (Lower Mississippian)	Not present in Kankakee area.
	Age of Fishes	Devonian		Not present in Kankakee area.
	Age of Invertebrates	Silurian		Dolomite.
		Ordovician		Shale, limestone, and sandstone
		Cambrian		Shale, limestone, and sandstone
Proterozoic Archeozoic "Early Life"		Referred to as "Pre-Cambrian" Time.		Metamorphic and crystalline rocks

COMMON TYPES of ILLINOIS FOSSILS

GRAPTOLITE

Cup coral

Lithostrotion

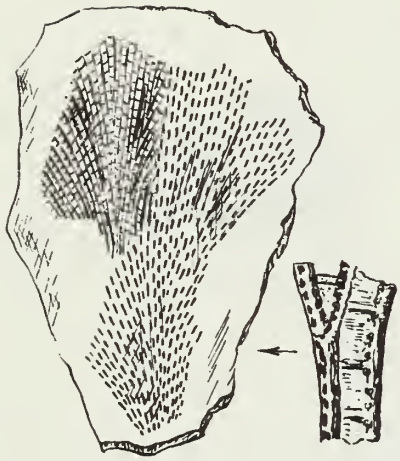
Honeycomb coral

CORALS

CRINOID

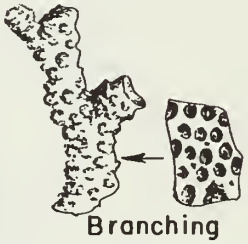
CYSTOID

PENTREMITE



Fenestella

Archimedes



Branching

BRYOZOA

Lingula

Orbiculoidea

Spiriferoid

Productoid

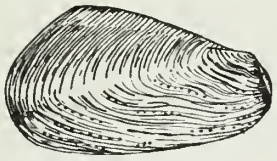
Composita

Pentameroid

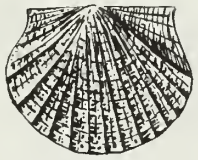
BRACHIOPODS

M.M.C.

COMMON TYPES of ILLINOIS FOSSILS



"Clam"



"Scallop"

PELECYPODS

High- spired

Low - spired

Flat - spired

GASTROPODS

Curved cone

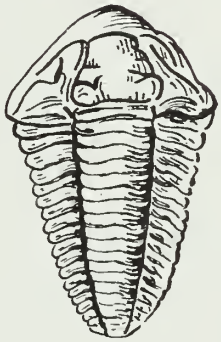
Straight cone

Coiled cone
(Nautilus)

CEPHALOPODS

Bumastus

Calymene
(coiled)



Calymene
(flat)

TRILOBITES

OSTRACODS
(greatly enlarged)

M.M.C.